

Svaelgfos being now in course of utilisation would furnish 23,000 horse-power. The Norwegian company had further projects in hand for the utilisation of three other waterfalls, including the Rjukanfos, the most considerable fall in Telemarken, which would yield more than 200,000 horse-power. According to the statement of Prof. Otto Witt, the yield of the Birkeland-Eyde furnaces was more than 500 kilograms of nitric acid per year for every kilowatt of power. The conditions in Norway were exceptionally good for the furnishing of power at exceedingly low rates. Hence the new product could compete with Chili saltpetre on the market, and would become every year more valuable as the demand for nitrates increased, and the natural supplies became exhausted.

#### POLAR EXPLORATION.

AFTER discussion at a meeting of explorers and geographers interested in the study of the polar regions, a statement was submitted to the congress held at Mons in September, 1905, setting forth the expediency of founding an International Association for the Study of the Polar Regions, with the objects of "(1) obtaining an international agreement upon different questions associated with polar geography; (2) making a general effort to reach the terrestrial poles; (3) organising expeditions having for their object an extension of our knowledge of the polar regions in every respect; and (4) forming a programme of scientific work to be carried out in the different countries during the existence of the International Polar Expeditions." The congress unanimously passed a resolution expressing the wish "(1) to see the formation of this Association in 1906 by a previous meeting of a general Conference of the larger scientific and maritime nations, who have taken part in the principal polar expeditions up to the present time; and (2) to see that the Belgian Government takes the initiative in approaching the Governments of other countries."

We have received a copy of a letter which has been addressed by M. Lecoïnte, to whom the congress entrusted the work of making the necessary preliminary arrangements, to the presidents of academies and of learned societies all over the world. It is proposed to hold the first conference at the beginning of May, for the consideration of general questions, and to discuss in detail "(1) the basis of a series of polar expeditions; (2) the programme of term of observations to be carried out in all the observatories; and (3) the text of the working arrangements of the International Association" at a second conference, composed of State delegates and delegates from academies and learned societies, in September. The conclusions arrived at by the second conference will be transmitted for examination to the Belgian Government, which eventually will ask the support of other countries for the new association.

In connection with the proposed International Association for the Study of the Polar Regions, M. Lecoïnte invites polar explorers to send him papers or notices dealing with questions which will be considered at the general conference in May next. A paper of the kind has been issued in which M. Henryk Arctowski makes a number of suggestions for work in the future. M. Arctowski expresses the opinion that in future Arctic research much use may be made of ice-breakers of the type of Makaroff's *Yermak*. With regard to Antarctic exploration, the settlement of the continental question is admittedly of primary importance, but M. Arctowski strongly urges the advisability of exploring thoroughly the circumpolar areas as a preliminary, especially by hydrographical expeditions.

#### UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The recommendation of the Forestry Syndicate with regard to the general management of the examinations, the schedules of the proposed forestry examination, &c., passed the Senate last Thursday. The most important of these recommendations is that the general conduct of the examinations and the prescription of courses of training are to be entrusted to a committee of the Board of Agricultural Studies. Such a committee will

include the professors of agriculture, botany, chemistry, and geology, and the reader in agricultural chemistry, together with three other members of the Board of Agricultural Studies. The committee will have the power to co-opt annually, if it thinks fit, four other persons.

The professor of experimental physics gives notice that a course of three lectures on "The Life-history of Surface Air Currents" will be given by Dr. W. N. Shaw, F.R.S., director of the Meteorological Office, in the Cavendish Laboratory on Wednesdays, February 14 and February 21, and Thursday, March 1.

LONDON.—Prof. E. A. Minchin commenced at University College on Monday a course of lectures on "Parasitic Protozoa." Prof. Minchin recently returned from Uganda, where he was engaged as one of the special commissioners of the Tropical Diseases Committee of the Royal Society in research on the life-history of the trypanosome of sleeping sickness.

PROF. DRUDE has been elected rector of the Dresden Technical High School for the ensuing year.

DURING January, Dr. Bolam, lecturer on chemistry at Queen Margaret College, Glasgow University, delivered in Leith Nautical College a short course of lectures on "The Chemistry of Dangerous Cargoes" to large nautical audiences. Mr. James Currie (of Messrs. James Currie and Co.) presided, and pointed out the importance of the course in view of the very complex cargoes merchant ships were now carrying.

MR. H. F. TRIPPEL directs attention to an important point in connection with army entrance examinations in a letter to the *Pall Mall Gazette* of February 3. Mathematics is a compulsory subject for every candidate competing for admission to the Royal Military Academy, Woolwich; yet Mr. Trippel says that in the recent examination one of the competitors who scored zero in mathematics was placed among the successful candidates. It appears, therefore, that though it is compulsory to take mathematics in the competitive examination, a candidate may do so without having any serious intention of gaining a single mark in the subject. Now that the attention of the authorities has been directed to the defect in the regulations which permits this course to be followed, it is to be hoped that a minimum standard of marks to be gained in mathematics by all candidates will be prescribed, or some other remedy found.

#### SOCIETIES AND ACADEMIES.

LONDON.

**Geological Society**, January 10.—Dr. J. E. Marr, F.R.S., president, in the chair.—The clay-with-flints: its origin and distribution: A. J. **Jukes-Browne**. Until recently the clay-with-flints has been regarded as being, in the main, a residue from the slow solution of the Chalk. Of late years, the opinion has been growing that it consists very largely of material derived from the Eocene. The present paper is devoted to an examination of the facts, with the view of ascertaining whether the clay-with-flints could possibly be derived from the Chalk, or whether the theory of its derivation from the Eocene is confirmed by more detailed inquiry. From several lines of investigation the author concludes (1) that the clay-with-flints cannot have been formed from mere solution of the Upper Chalk; (2) that all its components, except the unbroken and angular flints, could have been furnished by the Reading beds; (3) that the positions occupied by it are such that no great thickness of Chalk can have been destroyed to form it, the tracts being seldom more than 30 feet or 40 feet below the local plane of the Eocene base, or the presumed level of that plane.—Footprints from the Permian of Mansfield (Nottinghamshire): G. **Hickling**. These fossils were discovered in 1897 by Mr. Francis Holmes in the Rock Valley Quarry, Mansfield, in a local, lenticular mass of sandstone intercalated in the Magnesian Limestone. The prints present some resemblance to those named *Ichnium acrodactylum*, from the Upper Permian of Thuringia.

**Zoological Society**, January 16.—Mr. Howard Saunders, vice-president, in the chair.—Some bones of the lynx (*Felis lynx*) found in a limestone cavern in Cales Dale, Derbyshire: W. Storrs **Fox**. This was only the third record of remains of this species having been met with in the British Islands.—Mammals recently collected in the Malay Peninsula by Mr. C. B. Kloss, and presented to the National Museum: J. L. **Bonhote**. The collection contained examples of seventeen species, chiefly rodents, of which two, representing well known Bornean species, were described as new. There was also a series of *Mus jarak*, a species hitherto known from one specimen only, and recently described by the author.—The minute structure of the teeth of the creodonts: C. S. **Tomes**. The author stated that suggestions which had been made as to a possible relationship between the creodonts and the polyprotodont marsupials had rendered it interesting to see how far the structure of their teeth either supported or tended to disprove such speculations. Marsupial teeth possessed in the structure of their enamel a well marked peculiarity, namely, the free penetration of the epiblastic enamel by tubes continuous with those of the mesoblastic dentine, and it happened that recent Carnivora, the descendants, more or less direct, of the creodonts, also presented a disposition of the prisms of their enamel somewhat unusual amongst Mammalia. Teeth of *Hyændon*, *Sinopa*, *Oxyæna*, *Pachyaæna*, *Borhyaæna*, *Didynictis*, and *Cynodictis* had been examined, and in none of them were marsupial characters observed; on the contrary, in most of them characteristic carnivorous patterns were found, so that in Oligocene and Eocene times their enamel had already attained to its full specialisations.—Contributions to the anatomy of the Ophidia: F. E. **Beddard**.—Synopsis of the toads of the genus *Nectophryne*, with special remarks on some known species and description of a new species from German East Africa: Dr. J. **Roux**.

**Royal Meteorological Society**, January 17.—Mr. Richard Bentley, president, in the chair.—Annual general meeting.—Address on meteorology in daily life: R. **Bentley**. The president referred to the increasing interest shown lately throughout the country in the study of meteorology, and to the recent advances which had been made in it—more especially in the analysis of the composition of the atmosphere—and in the investigation of the upper currents of the air. He also laid stress on the increasing urgency of safeguarding the water supply, and gave various illustrations of the effects of weather on human life, on the land, on navigation, on transit, &c.

**Royal Microscopical Society**, January 17.—Dr. D. H. Scott, F.R.S., president, in the chair, annual meeting.—Annual address, the subject being "The Life and Work of Bernard Renault": **President**.

**Chemical Society**, January 18.—Prof. R. Meldola, F.R.S., president, in the chair.—The refractive indices of crystallising solutions, with especial reference to the passage from the metastable to the labile condition: H. A. **Miers** and F. **Isaac**. The authors found that the refractive index of a strong solution of sodium nitrate, measured at intervals while the liquid cools, rises to a maximum value and then falls, crystals appearing before the maximum is reached. There are always two periods of crystallisation: a first, in which a few crystals are growing gradually; a second, in which many crystals appear spontaneously. The authors regard these as being undoubtedly the metastable and labile states.—The effect of constitution on the rotatory power of optically active nitrogen compounds, part i.: M. B. **Thomas** and H. O. **Jones**. The resolution of a set of optically active nitrogen compounds and the examination of the rotatory power of their salts in dilute aqueous solution have been made in order to find the rotatory power of the ions. The values of  $[M]_D$  for some of the principal alkyl radicals are given.—The determination of available plant food in soil by the use of weak acid solvents: A. D. **Hall** and A. **Amos**. The authors have investigated the effect of repeating the attack of weak acid solvents on soils of known history derived from the Rothamsted experimental plots. In the case of soils continuously manured with superphosphate, the phosphoric acid goes into solution at a rate which decreases logarithmically, but

soils which have received complex manures do not show the same regular decrement in the amounts of phosphoric acid passing into solution.—The action of ammonia and amines on diazo-benzene picrate: O. **Silberrad** and G. **Rotter**.—The preparation of bistriazobenzene: O. **Silberrad** and B. J. **Smart**.—Gradual decomposition of ethyl diazoacetate: O. **Silberrad** and C. S. **Roy**.—Studies on nitrogen iodide, iii., the action of methyl and benzyl iodides: O. **Silberrad** and B. J. **Smart**.—Action of bromine on benzeneazo-o-nitrophenol: J. T. **Hewitt** and N. **Walker**.—The condensation of dimethylidihydroresorcin and of chloroketodimethyltetrahydrobenzene with primary amines, part i., monamines, ammonia, aniline, and *p*-toluidine: P. **Haas**.—Silicon researches, part x., silicon thiocyanate: J. E. **Reynolds**. The author found that silicon thiocyanate,  $\text{Si}(\text{SCN})_4$ , is best prepared by prolonged digestion of excess of pure lead thiocyanate in a benzene solution of silicon tetrachloride.—Halogen derivatives of substituted oxamides: F. D. **Chattaway** and W. H. **Lewis**. A number of substances obtained by the action of halogens on substituted oxamides are described.—Menthyl benzene-sulphonate and menthyl naphthalene- $\beta$ -sulphonate: T. S. **Patterson** and J. **Frew**.—Some reactions and new compounds of fluorine: E. B. R. **Prideaux**. The fluorine prepared by the electrolysis of anhydrous hydrogen fluoride, contained in a copper vessel, was found to contain oxygen produced at the anode even after the current had passed for a considerable time. Liquid fluorine has no solvent or chemical action on iodine or solid bromine. Bromine fluoride,  $\text{BrF}_3$ , was prepared for the first time. Gaseous fluorides of selenium,  $\text{SeF}_6$ , and tellurium,  $\text{TeF}_6$ , were prepared by direct combination. The vapour pressure curve of  $\text{SF}_6$  was compared with those of  $\text{SeF}_6$  and  $\text{TeF}_6$ , and shown to be similar.—Contributions to the chemistry of the rare earths, part i.: M. **Esposito**. The various methods advocated by Watts, Brauner, Popps, Mosander, Debray and others for the separation of cerium, lanthanum, and "old didymium" have been examined comparatively.—A synthesis of aldehydes by Grignard's reaction: G. W. **Monier-Williams**.—The action of ultraviolet light on moist and dry carbon dioxide: S. **Chadwick**, J. E. **Ramsbottom**, and D. L. **Chapman**.—A contribution to the study of stable diazo-compounds, preliminary note: G. T. **Morgan** and W. O. **Wootton**.—Triarylsulphonium bases: S. **Smiles** and R. **Le Rossignol**.—An improved apparatus for the continuous extraction of liquids with ether: R. S. **Bowman**. In this apparatus, which comprises a simple system of tubes, a condenser, and two ordinary flasks, the extraction is effected by passing cool liquid ether through the solution.

**Physical Society**, January 26.—Prof. J. H. Poynting, F.R.S., president, in the chair.—The isothermal distillation of nitrogen and oxygen and of argon and oxygen: I. K. **Inglis**. Mixtures of liquid nitrogen and oxygen are particularly suitable for an exact study of the relations obtaining during isothermal distillation, for the distillation bulb being the coldest instead of the hottest part of the apparatus, errors due to back condensation, &c., can be eliminated. In addition, the vapour can easily be circulated and passed time after time through the liquid until equilibrium is complete. Experiments were carried out in this way in a specially designed apparatus, and the results showed that the ratio of nitrogen to oxygen in the vapour was not in a constant proportion to the same ratio in the liquid. When, however, the partial pressures of nitrogen and oxygen were plotted against the concentrations in the liquid a straight line was obtained in the case of nitrogen and a curve in the case of oxygen. This indicated that nitrogen obeyed Henry's law of solubility, and the deviation in the case of oxygen pointed to its being slightly associated in the liquid state when mixed with nitrogen. A few experiments were also carried out with mixtures of argon and oxygen. At the temperature used, argon was a volatile solid, and therefore the greatest concentration of argon that could be obtained was that of the saturated solution in oxygen. Argon seemed to agree with nitrogen in obeying Henry's law.—The use of chilled cast iron for permanent magnets: A. **Campbell**. The present investigation was made on rings in addition to rods of the standard dimensions usual in testing magnet-steels. All

the specimens were heated to 1000° C. and then chilled in cold water, care being taken to support them during the process, as cast-iron is very brittle at such a high temperature. The rods were tested for maximum remanent B and coercivity by Madame Curie's method, the magnetised bar being placed in a long solenoid producing a demagnetising field which was gradually increased until a search-coil slipped along the bar showed that the demagnetisation was complete. The results showed the chilled cast-iron to be not very inferior to ordinary magnet-steel. By ballistic tests on the two rings, their permeability curves were obtained, and these indicated that the simple process of chilling used was quite satisfactory even for a tolerably massive ring of 6 sq. cm. cross section. The cheapness and ease of working cast-iron should encourage instrument makers to test its capabilities in various instruments.—Experiments on the propagation of longitudinal waves of magnetic flux along iron wires and rods: Prof. Lyle and Mr. Baldwin. The experiments described in the paper were undertaken with the object of determining if there is a definite rate of propagation of magnetism in iron. The method adopted was to produce magnetisation at a particular point on a bar by means of a coil through which an alternating current was passed, and then to observe the magnetic flux at various distances from the coil by means of a small secondary coil, free to be moved to various places on the bar. By the use of Prof. Lyle's wave-tracer the magnetic flux at various points along the bar was thus obtainable. The wave curve was then analysed by Fourier's series. Various curves given in the paper show the value of the constants in Fourier's series and of the lag in the magnetisation as the coil was moved along the bar. Contrary to what had been observed in previous researches, the authors found that the phase lag, instead of continuously increasing along the bar, reached a maximum value and then diminished, proving the absence of true wave propagation.

**Mineralogical Society**, January 23.—Prof. H. A. Miers, F.R.S., president, in the chair.—Studies in crystallisation; sodium nitrate: H. A. Miers and J. Chevalier. Microscopic observations were made upon solutions of known strength contained in open tubes or sealed tubes maintained at a known temperature, or in the form of drops upon a slide, with the object of comparing the growth of crystals in metastable and labile solutions respectively. The limits of the labile state (in which the solution can crystallise spontaneously) have been fixed by previous experiments by H. A. Miers and Miss F. Isaac. If a crystal of the salt be introduced into a supersaturated solution which is not labile, the centres of growth of new crystals are on its surface, and they grow in parallel positions upon it; if it be introduced into a labile solution the new centres of growth are in its neighbourhood, and the crystals fall upon it in various positions. If it be moved about in either, a cloud of crystals is produced; but in the metastable solution this appears to be due to minute crystals which are swept from its surface. A crystal having appeared spontaneously can continue to grow in a labile solution without producing others in its neighbourhood, but if introduced it at once produces a cloud. This may be because the growing crystal is surrounded by a zone of metastable solution.—Geikielite and the ferro-magnesian titanates: T. Crook and B. M. Jones. Geikielite occurs in association with magnesian menaccanite and common ilmenite (menaccanite) in the gem gravels of the Balangoda and Rakwana districts of Ceylon. A considerable number of analyses indicate that geikielite varies in composition, the iron oxides ranging from 8 per cent. to 14 per cent. No specimen has hitherto been found which contains less than 8.1 per cent. of iron oxide. For this reason the formula  $(Mg, Fe)TiO_3$  is preferable to  $MgTiO_3$  as expressing the true composition of geikielite. Magnesian menaccanite containing about 28 per cent. of iron oxide is very closely allied to geikielite in all its properties, more so than to common ilmenite. The alteration products of geikielite are similar to those of ilmenite, consisting of rutile and so-called leucoxene; the latter is a mixture of amorphous titanic acid, sphene, and limonite. It seems advisable to classify the ferro-magnesian titanates as ilmenites and geikielites, treating magnesian menaccanite

(which has the formula  $(Fe, Mg)TiO_3$ , where  $Fe : Mg = 1 : 1$ ) as the middle member of the series.—G. F. Herbert Smith exhibited, and explained the use of, a diagram for the graphical determination of the refractive index from the prism angle and the angle of minimum deviation. He also explained a simple test for ascertaining the pair of faces corresponding to any refracted image.

## DUBLIN.

**Royal Dublin Society**, December 19, 1905.—Dr. R. F. Scharff in the chair.—The causes of "blowing" in tins of condensed milk: Dr. G. H. Pethybridge. Blowing (i.e. bulging) is caused by the accumulation of gas produced by the fermentation of the cane sugar added during manufacture by certain wild yeasts or torulæ, which can ferment saturated solutions of sugar, and appear to be present in the original milk supplies, and are not introduced during the process of manufacture.—Two new species of Collembola for Ireland: Prof. G. H. Carpenter. The species described belong to the genera Isotoma and Entomobrya, the latter showing some interesting special affinities with Orchesella.

## EDINBURGH.

**Royal Society**, January 8.—Prof. Crum Brown, vice-president, in the chair.—*Bathydraco Scotiae*, Poisson abyssal nouveau recueilli par l'Expedition Antarctique national Ecossaise. Note préliminaire: Louis Dollo. The genus *Bathydraco* was instituted by Günther in 1878 for a small fish (*B. antarcticus*, Günth.) from the south east of Heard Island, inhabiting a depth of 1260 fathoms. The new species, named by M. Dollo, was obtained in the Weddell Sea at a depth of 1410 fathoms.—Influence of thymus feeding on allantoin excretion: Dr. J. MacLachlan. The work was based on experiments carried out in the laboratory of the Royal College of Physicians of Edinburgh. Reference was made to the very unsatisfactory nature of the evidence on the influence of uric acid and nucleins on the production of allantoin, and it was pointed out that the administration of thymus substance was invariably followed by a large production of allantoin. The point investigated was whether this was due to the conversion of the nucleins and puric bodies contained in the thymus or to some specific action of the substance. Boiling the thymus before it was administered reduced its power of producing allantoin to less than half. Thymus also was found to exercise a much more marked effect in causing the production of allantoin than other glands, such as pancreas, liver, and lymphatic glands, which are also rich in nucleins. The conclusion drawn was that raw thymus when administered produced a specific action on the metabolism by which the formation of allantoin was increased.—A theorem in hyper-complex numbers: J. H. MacLagan Wedderburn. A short proof was given of a theorem, first proved by Scheffers, that an algebra which contains the quaternion algebra can, if the moduli of the two algebras are the same, be expressed as the product of the quaternion algebra and another algebra. The theorem was then extended to a large and important class of algebras.

January 22.—Lord M'Laren, vice-president, in the chair.—A form of initiational disturbance more convenient than that of §§ 3-31 of previous papers on waves: Lord Kelvin. The investigations of §§ 5-31, including the "front and rear" of infinitely long free processions of waves in deep water, are all founded on superposition of equidistant initiational disturbances, the first of two typical forms described in §§ 3, 4. In this form the initial disturbance is everywhere elevation or everywhere depression, and its amount at great distances from the middle varies inversely as the square root of the distance from a horizontal line at a small height above the water surface in the middle of the disturbance. A type-disturbance derived mathematically from that used in §§ 5-31 by double differentiation with reference to time, or by single differentiation of the second of the forms of §§ 3, 4 with reference to space, is given in the present paper, and illustrated by diagrams of curves placed before the society, in which the initial disturbance has as much water above as below the undisturbed level; and at great distances the depression or elevation varies inversely as the  $3/2$  power

of the distance. This derived solution is used in the two following papers, for which it is found much more convenient than the solution used in §§ 5-31.—Illustrations of the indefinite extension and multiplication of a group of two-dimensional deep-sea waves, initially finite: Lord Kelvin. The water is left at rest and free, after being artificially displaced to a configuration of a finite number of sinusoidal mountains and valleys—five mountains and four valleys in the initiation of the diagrams placed before the society. Immediately after the water is left free, the disturbance begins analysing itself into two groups of waves, seen travelling in contrary directions from the middle line of the diagram. The perceptible fronts of these two groups extend rightwards and leftwards from the end of the initial single static group, far beyond the "hypothetical fronts" supposed to travel at half the wave velocity, which (according to the dynamics of Osborne Reynolds and Rayleigh in their important and interesting consideration of the work required to feed a uniform procession of water-waves) would be the actual fronts if the free groups remained uniform. How far this is from being the truth is illustrated by the diagrams. Besides the great extension of the fronts outward from the middle, we see that the two groups, after emergence from perceptible co-existence in the middle, travel with their rears leaving a widening space between them of water not perceptibly disturbed, and with wavelets in ever augmenting number following slower and slower in the rear of each group and causing the extreme perceptible rear to travel at a much smaller speed than half the "wave velocity." It is obviously difficult to give any definition of an "effective front," or of a "centre of group," or of a "virtual rear," according to which we could regard the group as travelling with half the wave velocity or with any single definite velocity.—The initiation and continued growth of a train of two-dimensional waves due to the sudden commencement of a stationary periodically varying forcive: Lord Kelvin. A forcive consisting of a finite sinusoidally varying pressure is applied, and kept through all time applied, to the surface of the water within a finite practically limited space on each side of the middle line of the disturbance. In the beginning the water was everywhere at rest and its surface horizontal. The problem to be solved is, to find the elevation or depression of the water at any distance from the mid-line of the working forcive, and at any time after the forcive began to act. The solution was illustrated by two diagrams—time curves—one showing the motion of the water at the mid-line of the working forcive, the other showing the motion at a distance from this line equal to the wave-length that would be in an endless uniform procession of waves having period equal to the period of the disturbing forcive. Calculations are in progress to give the motion of the water at eight wave-lengths from the source. The detailed calculations were made and the curves drawn for Lord Kelvin by Mr. George Green.

*Erratum.*—In the report of the meeting of November 20, 1905 (NATURE, December 28, 1905), the words "quite did away with" on p. 216, line 23, should be "had no appreciable effect on."

PARIS.

Academy of Sciences, January 29.—M. H. Poincaré in the chair.—New researches on the insoluble alkaline compounds contained in living plants: M. Berthelot.—The capture of a whale (genus *Kogia*) near Roscoff, English Channel: Yves Delage. The animal was captured at Siec, about 6 kilometres from Roscoff. The species is extremely rare, and has never been previously observed in European waters.—Certain systems of circles and spheres which occur in the deformation of quadratics: C. Guichard.—The perpetual secretary announced the death of Sir John Burdon-Sanderson, correspondant for the section of medicine and surgery.—Differential equations of the second order of which the general integral is uniform: M. Gambier.—The flame spectrum of mercury: C. de Watteville. Attempts to photograph a flame spectrum of mercury have been hitherto unsuccessful. By the use of solutions of the acetate and cyanide of mercury, sprayed into a flame, the author has been successful in obtaining the flame spectrum of mercury, consisting of the single line 2536-72. This line was measured by Kayser and

Runge in the arc spectrum of mercury.—The duration of the discharge in an X-ray tube: André Broca. With equivalent sparking distances varying from 6 cm. to 10 cm., the time was practically constant, 0.0006 sec.—The diminution of the radio-activity of polonium with time: Mme. Curie. The intensity of the radiation diminishes with the time according to a simple exponential law,  $I = I_0 e^{-at}$ . If  $t$  is expressed in days,  $a = 0.00495$ , or the intensity falls to half its value in 140 days. A diagram is given showing the linear relation between  $\log I$  and the time, the deviations between the values obtained from the above law and from experiment not exceeding 3 per cent. The agreement of the constant (0.00495) with that found by Marckwald for radiotellurium (0.00497) shows that the latter substance is identical with polonium.—The sulphates of some rare metals: Camille Matignon. Thermochemical measurements on the sulphates of lanthanum, praseodymium, neodymium, and samarium.—The rapid preparation of solutions of hydriodic acid: F. Bodroux. A given weight of iodine is divided into two equal portions. By the interaction of barium peroxide and the first portion, barium iodide is produced; the remainder of the iodine is dissolved in the solution of barium iodide, and the liquid treated with sulphur dioxide until decolorised, filtered from the barium sulphate, and redistilled.—An alloy of thorium and aluminium: O. Höngschmid. This alloy, the composition of which corresponds to the formula  $\text{ThAl}_3$ , can be obtained in the form of long hexagonal prismatic needles possessing the colour and metallic lustre of aluminium, by the reduction of thorium oxide by aluminium in the electric furnace. It can also be obtained by the interaction of aluminium and the double fluoride of aluminium and thorium at a high temperature.—Researches on the halogen compounds of the borates of barium and strontium: L. Ouvrard. The borates of barium and strontium appear to enter into combination with chlorine and bromine less easily than the corresponding salts of calcium, only one halogen compound of each being obtainable.— $\alpha$ - and  $\beta$ -campholytic alcohols: G. Blanc. Details of preparation and physical properties. The pyruvic ester of each is described, and the corresponding semicarbazones.—The influence of the reaction of the medium upon the activity of the diastases: A. Fernbach. Remarks on a recent note on the same subject by L. Maquenne and E. Roux.—The nutrition of green plants by amides in the absence of carbon dioxide: Jules Lefèvre. Experiments made on the dwarf nasturtium led to the following conclusions:—Plants deprived of carbon dioxide and amides lose a notable proportion of their initial weight, this loss being due to respiration. Plants kept in the light, with amides present in the soil, in spite of the absence of carbon dioxide, developed and increased their dry weight. Light is essential for the utilisation of the amides by the plant.—A new parasitic fungus, *Trematocysta Matruhoti*, causing the disease of the silver lime tree: Nicolas Jacobesco. This fungus is the cause of a disease which has ravaged the lime forests of Wallachia. It appears to belong to a new family.—The classification into genera of the family of the Bradypodidae (genus *Hemibradypus*): R. Anthony.—Contribution to the general morphology of the higher Protozoa: J. Kunstler and Ch. Gineste.—The anatomy and histology of the Ixodidae: A. Bonnet.—The effect of the injection of extract of the interstitial gland of the testicle on the growth: P. Ancel and P. Bouin.—Tables of growth drawn up in 1905 from the measurements of 4400 Parisian children between the ages of one and fifteen years: MM. Variot and Chaumet. The results are given both in graphical and tabular form, comparison being made with similar measurements of Bowditch (Massachusetts) and Rotch (Boston).—The physiological conditions of oral teaching: Pierre Bonnier. The effects of a want of knowledge of the principles of voice production are throat troubles with the teachers and increased mental effort on the part of the pupils. Measurements are given showing the importance of the latter effect.—Chloroform anaesthesia. The estimation of the chloroform before, during, and after anaesthesia is set up, and the quantity in the blood at the moment of death: Maurice Nicloux.—The Neocretaceous ammonites collected by the Swedish Antarctic Expedition: W. Killian.—The geology of the Peloponnesus: Ph. Negriss.

## GÖTTINGEN.

**Royal Society of Sciences.**—The *Nachrichten* (physico-mathematical section), parts iv. and v. for 1905, contains the following memoirs communicated to the society:—

July 8.—Determination of all curves by the translation of which minimal surfaces are generated: P. Stäckel.

July 22.—Outlines of a general theory of linear integral equations, x., Riemann's problems in the theory of functions of a complex variable: D. Hilbert.—On finite algebras: L. E. Dickson.—On pyroelectricity in centrosymmetric crystals; with appendix (October 28): On the piezoelectricity of centric crystals: W. Voigt.

August 5.—On the origin of the salt deposits of north-west Germany: A. von Koenen.

November 25.—Remarks on an essay on the stellate appearance of the stars (*Nachrichten*, 1905, p. 238). The effect of the background on the estimation of magnitude (e.g. of the moon on the horizon). The "jumping" of the image in vision with the right and the left eye alternately: W. Holtz.—Measurements of the density of the vertical electric conduction-current in free air made during the balloon voyage of August 30, 1905: H. Gerdien.—The Doppler effect in "Canal-strahlen" and the spectra of positive atomic ions: J. Stark.—Determination of all curves by the translation of which minimal surfaces are generated: G. Scheffers.

The official communications, part ii., for 1905, of the *Nachrichten* contain an anniversary address by W. Voigt on hypotheses concerning work.

## DIARY OF SOCIETIES.

THURSDAY, FEBRUARY 8.

**ROYAL SOCIETY**, at 4.30.—On Roche's Ellipsoids and on Allied Problems Relating to Satellites: Sir George H. Darwin, K.C.B., F.R.S.—Polarisation in Secondary Röntgen Radiation: Dr. C. G. Barkla.—Ionic Size in Relation to the Physical Properties of Aqueous Solutions: W. R. Bousfield, K.C.—Explosions of Coal-Gas and Air: Prof. B. Hopkinson.—On Periodicities in Sun-spots: Prof. A. Schuster, F.R.S.—Constants of Explosion of Cordite and of Modified Cordite: Dr. Robert Robertson. **INSTITUTION OF ELECTRICAL ENGINEERS**, at 8.—Technical Considerations in Electric Railway Engineering: F. W. Carter (*Conclusion of Discussion*).—Crane Motors and Controllers: C. W. Hill. **ROYAL INSTITUTION**, at 5.—The Significance of the Future in the Theory of Evolution: Benjamin Kidd. **MATHEMATICAL SOCIETY**, at 5.30.—Special General Meeting.—Partitions of Numbers in Space of two Dimensions: Major P. A. MacMahon.—The Eisenstein-Sylvester extension of Fermat's Theorem: Dr. H. F. Baker.

FRIDAY, FEBRUARY 9.

**ROYAL INSTITUTION**, at 9.—Eclipse Problems and Observations: H. F. Newall, F.R.S. **ROYAL ASTRONOMICAL SOCIETY**, at 5.—Anniversary Meeting. **PHYSICAL SOCIETY**, at 8.—Annual General Meeting. Address by the President-elect, Prof. J. Perry, F.R.S. **ROYAL GEOGRAPHICAL SOCIETY**, at 5.30 (Research Department).—The Ruins of Rhodesia and the Probable Date of Outside Intrusions in East Africa: Discussion to be opened by D. Randall MacIver. **MALACOLOGICAL SOCIETY**, at 8.—Annual Meeting.—On Pearl-Oyster Culture and Pearl Fishing: T. H. Haynes.—Irish Molluscs and their Habitats: R. J. Welch. **INSTITUTION OF CIVIL ENGINEERS**, at 8.—Electric Driving at the Locomotive Works of the North London Railway: R. H. Mackie.

SATURDAY, FEBRUARY 10.

**ROYAL INSTITUTION**, at 3.—Advances in Microscopy: J. W. Gordon. **MONDAY, FEBRUARY 12.** **ROYAL GEOGRAPHICAL SOCIETY**, at 8.30.—The Geography of the Spanish Armada: Rev. W. Spotswood Green. **SOCIETY OF ARTS**, at 8.—Modern Warships: Sir William White, K.C.B., F.R.S.

**INSTITUTION OF MECHANICAL ENGINEERS**, at 8.—Graduates' Lecture: The Niagara Power-Station: Prof. W. C. Unwin, F.R.S.

TUESDAY, FEBRUARY 13.

**ROYAL INSTITUTION**, at 5.—Food and Nutrition: Prof. W. Stirling. **ANTHROPOLOGICAL INSTITUTE**, at 8.15.—Exhibition of Lantern-slides of Kikuyu Ceremonies: W. Scoresby Routledge.—Exhibition of Kikuyu Ceremonial Images: T. A. Joyce.—Exhibition of Slides of Rude Stone Monuments and Notes on Stone Monuments in Glamorganshire: A. L. Lewis.

**INSTITUTION OF CIVIL ENGINEERS**, at 8.—*Adjourned Discussion*: The Railway-Gauges of India: F. R. Upcott.—*Probable Papers*: Country Roads for Modern Traffic: J. E. Blackwall.—A Plea for Better Country Roads: G. R. Jebb.

WEDNESDAY, FEBRUARY 14.

**SOCIETY OF ARTS**, at 8.—The Horseless Carriage, 1885-1905: Claude Johnson.

THURSDAY, FEBRUARY 15.

**ROYAL SOCIETY**, at 4.30.—*Probable Papers*: The Influence of Increased Barometric Pressure on Man, No. 1: Dr. L. Hill, F.R.S., and M. Greenwood.—On the Existence of Cell-communications between Blastomeres: C. Shearer.—Innervation of Antagonistic Muscles. Ninth Note: Successive Spinal Induction: Prof. C. S. Sherrington, F.R.S.—The

Chemical Constitution of Protoplasm as shown by the Rate of Tissue Disintegration: Dr. H. M. Vernon.—The Development of the Head-Muscles of the Common Fowl (*Gallus domesticus*), together with some Remarks on the Head-Muscles of Reptiles: Prof. F. H. Edgeworth. **CHEMICAL SOCIETY**, at 8.30.—Cuprous Formate: A. Angel.—The Solubility of Triphenylmethane in Organic Liquids with which it forms Crystalline Compounds: H. Hartley and N. G. Thomas.—The Spontaneous Crystallisation of Supersaturated Solutions: H. Hartley.—The Preparation and Properties of some New Troponines: H. A. D. Jowett and A. C. O. Hann.—Studies in Asymmetric Synthesis, Part IV., The Application of Grignard's Reaction for Asymmetric Syntheses: A. McKenzie.

**LINNEAN SOCIETY**, at 8.—The Structure of *Isis hippuris*: J. J. Simpson.—Note on the Geographical Distribution of the Genus *Shortia*, Torr. and Gray: B. Daydon Jackson.—Exhibition: Developmental Changes in Zoogloea (with Lantern Slides): Dr. H. Charlton Bastian, F.R.S. **SOCIETY OF ART**, at 4.30.—The Navigable Waterways of India: R. B. Buckley, C.S.I.

**INSTITUTION OF MINING AND METALLURGY**, at 8.—Pyritic Smelting: R. C. Alabaster and F. H. Wintle.—The Acme Combined Concentrating Table: L. H. L. Huddart.—Stadia in Careful Work: A. H. Webb.—The Detailed Mapping of Stoping Areas: H. R. Sleeman.—Sinking, Development and Underground Equipment of Deep Level Shafts on the Rand: A. E. Pettit.—The Hydraulic Filling of a Coal Seam at Lens, Pas de Calais, France: L. E. Hill and M. Butt.

FRIDAY, FEBRUARY 16.

**ROYAL INSTITUTION**, at 9.—The Passage of Electricity through Liquids: W. C. D. Whetham, F.R.S.

**INSTITUTION OF MECHANICAL ENGINEERS**, at 8.—Large Locomotive Boilers: G. J. Churchward.

SATURDAY, FEBRUARY 17.

**ASSOCIATION OF TEACHERS IN TECHNICAL INSTITUTES** (Regent Street Polytechnic), at 7.30.—The Teaching of Mathematics to Engineering Students: G. E. St. L. Carson.—The Teaching of Mathematics to Building Trade Students: H. Busbridge.

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